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BLASTING TO IMPROVE WILDLIFE ENVIRONMENT IN MARSHES¹

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Numerous investigations have shown the inefficiency of habitats in which the cover type is dense and continuous. The game manager, cognizant of this evidence, has attempted to remove restrictions of habitats by opening them. Many areas wasted because of dense vegetative cover have been improved by clearing operations.

Marshes choked with rank growths of emergent vegetation are a monotonous cover type subject to such improvement. McAtee's (1930) discussion of blasting as a means of creating duck ponds suggests a technique for improvement of marshes.

The authors here report on the experimental use of dynamite as a means of opening up stands of marsh vegetation. This work was carried out during the summer of 1939 at Little Wall Lake, a 230-acre marsh near Jewell, Iowa, grown up to a dense *Scirpus-Typha* (bulrush-cattail) community.

In planning procedure, consideration was given to the edge-effect desired and to the economical use of dynamite. It was decided that a ditch, 9 to 12 feet wide and 3 to 4 feet deep would meet the requirements.

The location and direction of the

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excavations were selected so as to provide desired wave action in the completed ditch. The site was cleared of vegetation with a brush hook, to facilitate the work of the loading crew. The use of plank walks in "soupy" parts of the marsh also aided materially, especially in connection with the clearing of vegetation and the transporting of dynamite.

The blasting was done by the propagation method in which the explosion of a single charge detonates all the others, thus eliminating the cost of capping each individual load. This method may be effectively employed only in wet soils. A straight row of charges was insured by following a line stretched along the proposed site. Charges were placed at 18-inch intervals where there were less than three cartridges to a place, and at 24-inch intervals for heavier charges.

Loading tools such as the T-punch bar and T-core punch bar were available, but it was found that a broom handle notched at 12 inch intervals could be used very efficiently in punching and loading holes in the soft, wet soil.

The size of charge was governed by the depth of soil and water above the surface of the hardpan. Loads of one stick were used for 2.5 feet, 2 sticks for 3.5 feet and 3 sticks for 4.5 feet of soil and water, respectively. Heavier charges were not tried. Best results were obtained where the bottom cartridge of each charge rested upon the hardpan.

It proved advantageous to blast during strong winds as the debris lifted was blown away and did not fall back into the excavation. Accordingly the blasting proceeded with the wind so that the soil from successive blasts was blown clear.

The result of a properly placed blast in muck and peat was a ditch 9 to 12 feet wide (Plate 12A). Any desired length may be had, but it is not efficient to shoot more than 300-400 feet at a time. Shoulders were thrown up on either side ranging from one to six feet wide and from one to three feet high (Plate 12B). The depth of the ditch when blasted over hardpan was limited to the distance from the water surface to that of the hardpan.

Excavations were attempted in deep muck and peat with the same method used over hardpan except that the top of the upper stick of each charge was set about one foot below the water surface. These results were practically worthless. A single-line placement with 2- and 3-stick charges was tried in muck and peat known to be over 10 feet deep. The result (Plate 13) was a narrow ditch (7 to 8 feet) with low shoulders and "soupy" with powdered peat. The explosion seemed to have been so effectively cushioned that it had but little lifting power. However, in locations where running water could be directed

through the channel it could be sliced out.

The cost of materials and labor varied with each type of excavation. Ditches were made in the experimental work here discussed at a cost of about 14 cents a cubic yard. However, this can hardly be considered representative of costs on large projects where materials could be obtained at wholesale prices. For estimating costs on such projects the following information may prove helpful. In these experiments a two-man crew excavated approximately 100 feet of ditch an hour. The size of charge varied with the requirements of each blast, but only one cap was needed for each blast when the propagation method was used.

Successful application of the blasting technique here described is largely limited to marshes having a hardpan sub-stratum. However, the conclusion should not be drawn that dynamite cannot be satisfactorily employed in opening up other types of marshes. It is probable that further experiments will result in such modifications of the technique as to make it applicable to the more difficult situations.

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Ditch blasted in deep muck and peat. Note narrowness and absence of raised shoulder.



A (*Upper*) — Ditch ten feet wide, three to four feet drop, blasted over hardpan.

B (*Lower*) — Shoulder on a ditch blasted over hardpan.